Appendix F

Air Quality Study

Appendix F:
Air Quality Technical Memorandum
Antelope Valley Draft Environmental Impact Statement

1.0 Introduction

An air quality analysis of the potential impacts of the Draft Single Package was performed as part of the Draft Environmental Impact Statement (DEIS). Details of the MOBILE 5a and CAL3QHC models as well as analysis findings are presented below.

2.0 Air Quality Models

2.1 MOBILE 5a Model

The MOBILE 5a program is used to predict vehicle exhaust emission factors. Because newer cars with better pollution-control devices are replacing older cars, the vehicle mean exhaust emission factors usually decrease faster than the traffic volumes increase each year. Consequently, the projected first year of traffic activity is used to simulate (even overestimate) a "worse-case" situation for the design life span of the alternatives.

MOBILE 5a Inputs. MOBILE 5a default values for the study area operating mode (percent cold and hot starts) and percent of diesel vehicles were used. A Reid vapor pressure (RVP) of 10 psi was considered representative. Since vehicle exhaust emissions are higher during colder months, an ambient temperature of -5° C (24° F) (an average temperature for December through February) was assumed. The year 2002 was input into the model to calculate the exhaust emission factors.

Emission Factors. Emission factors for traffic during free-flow and idling conditions are determined using the MOBILE output and projected peak hour traffic and vehicle categories. Vehicles are grouped into three categories; Light Duty Vehicles (LDV), Light Duty Trucks (LDT) and Heavy Duty Trucks (HDT). LDT include all vehicles having two axles and six wheels, generally having a gross weight greater than 44 000 Newtons (10,000 pounds) but less than 116 000 Newtons (26,000 pounds). HDT include all vehicles having three or more axles, generally having a gross vehicular weight greater than 116 000 Newtons (26,000 pounds).

Free Flow Traffic. The free flow emission factors for the roadway segments analyzed are summarized in Table F-1. An example calculation is provided below.

Assume vehicle mix on roadway is 95% LDV, 3% LDT and 2% HDT and travel speed is 48 kmph (30 mph).

Calculate CO emission for each vehicle class. Use Mobile model CO emissions for 30 mph and vehicle class %.

- (LDG vmt % x Exhaust CO) + (LDD vmt % x Exhaust CO) = LDV Exhaust (g/mile)

  (99.8 % x 22.17) + (0.2 % x .96) = 22 grams/mile
- (LDGT vmt % x Exhaust CO) + (LDDT vmt % x Exhaust CO) = LDT Exhaust (g/mile)

  (99.6 % x 33.31) + (0.4 % x 1.06) = 33 g/mile
- (HDGT vmt % x Exhaust CO) + (HDDT vmt % x Exhaust CO) = HDT Exhaust (g/mile)

  (30.4 % x 33.41 + (69.6 % x 7.31) = 15 g/mile

Calculate composite emission factor based upon vehicle mix % from traffic study.

- 95% LDV x 22 g/mile = 20.9
- 3% MDT x 33 g/mile = 0.99
- 2% HDT x 15 g/mile = 0.30

  Total. = 22.19 g/mile

Idling traffic. The idling traffic emission factors for the intersections analyzed are summarized in Table F-2. All idle emission factors are based upon a speed of 4.0 kilometers (2.5 miles) per hour. Idle emission factor calculations and an example of an intersection emission factor calculation are provided below.

Idle emission factor calculations:

Convert grams/mile to grams/hour by multiplying MOBILE exhaust CO by 4.0 kilometers per hour (2.5 miles/hour).

- LDGV = (167.16 g/mile x 2.5 m/hr) = 418 g/hr
- LDDV = (4.8 g/mile x 2.5 mile/hr) = 12 g/hr
- LDGT = (241 g/mile x 2.5 mile/hr) = 603 g/hr
- LDDT = (5.3 g/mile x 2.5 mile/hr) = 13 g/hr
- HDGT = (185 g/mile x 2.5 mile/hr) = 463 g/hr
- HDDT = (36.5 g/mile x 2.5 mile/hr) = 91 g/hr

Determine composite emission factor for vehicle class.

- (LDGV % x CO g/hr) + (LDDV % x CO g/hr)
- (98 % x 418) + (0.2 % x 12) = 417 g/hr for LDV
-
- (LDGT % x CO g/hr) + (LDDT % x CO g/hr)
- (99.6 % x 603) + (0.4 % x 13.25) = 601 g/hr for LDT
-
- (HDGT % x CO g/hr) + (HDDT % x CO g/hr)
- (30.4 % x 463) + (69.6 % x 91 g/hr) = 204 g/hr for HDT

Example of an intersection emission factor calculation:

Assume intersection vehicle mix is 98.0 % LDV, 1.6 % MDV, 0.4 % HDV

- 98.0 % LDV x 417 g/mile=409.0 g/hr
- 1.6 % MDV x 601 g/hr = 9.6 g/hr
- 0.4 % HDV x 204 g/hr = 0.8 g/hr

  Total = 4 19.4 g/hr

Table F.1
COMPOSITE EMISSION FACTORS: FREE-FLOW SEGMENTS

Roadway	Emissions (grams/vehicle-mile)
North-South Roadway (K Street to Q Street)	27.5
North-South Roadway (Q Street to Military)	18.5
Adams Street Connector	18.5
East-West Roadway (Cornhusker - Superior)	15.8

TABLE F.2
COMPOSITE EMISSION FACTORS: INTERSECTIONS

Intersection	Emissions (grams/hour)
New Road and O Street	
North-South Bound	419
East Bound	422
West Bound	443
North-South and East-West Roadway	
All Directions	419
New Road and Cornhusker Highway	
North-South Bound	419
East-West Bound	416
New Road and Vine Street	
All Directions	419
New Road and Theresa Street	
North-South Bound	419
East-West Bound	418

2.2 CAL3QHC Model

The CAL3QHC model is listed in 40 CFR Appendix W, "Guidelines on Air Quality Models (guidance)" as an appropriate model. The CAL3QHC model can predict carbon monoxide or other inert pollutant concentrations from both moving and idling vehicles. The model is based upon the Gaussian diffusion equation and employs a mixing zone concept to characterize pollutant dispersion over the roadway.

2.2.1 Model Inputs

Meteorology. The regulatory default values for the following parameters were used:

Wind Speed:	1 meter/second
Stability Class:	D for an urban area
Wind Direction:	"Worst Case" wind direction angle (determined using 10-degree increments.
Mixing Height:	1 000 meters

Emission Factors. The composite emission factors derived from the MOBILE 5a program were input.

Roadway, Intersection, and Receptor Parameters. The geometrics of the roadways and intersections were derived from the *Phase III Report, Draft Single Package*, Antelope Valley Study Team, December 1997. Sensitive receptors were identified and input in relation to the proposed location of the roadways and intersections. Additional receptors for intersection analyses were located along the proposed right-of-way, near the intersections.

The Beadle Center and greenhouse complex air intakes were input at 3.0 meters (10.0 feet) above ground and all other receptors heights were input at 1.8 meters (6.0 feet).

Source heights were input at 0 meters with the exception of the elevated intersection that was input at 7.6 meters (25.0 feet) above ground.

Other Site Variables. Various surface roughness factors (Z_0) were input based upon the surrounding land use. The factors ranged from 321 cm representing a central business district to 108 cm representing single-family residential. The settling velocity (V_s) and the deposition velocity (V_d) were set at zero because carbon monoxide is a gaseous emission. All predicted CO concentrations are based upon an averaging time of 60 minutes.

Traffic Parameters. Morning and evening traffic volumes and vehicle mix for the year 2020 were obtained from the *Travel Demand Forecasting Summary Report*, 1997. The study projected the peak-hour traffic for roadways and intersections within the Draft Single Package study area. This study considered projected regional growth and commercial development that would have an impact with the study area.

Table F.3
YEAR 2020 PEAK HOUR: FREE-FLOW TRAFFIC VOLUME

Roadway Segment	Peak Hour		LDV %	LDT %	HDT %
	A.M.	P.M.			
New Road - K to L Street	3096	3202	98	1.4	0.6
New Road - L to O Street	5650	5707	98	1.4	0.6
New Road - O to Q Street	5021	5142	98	1.4	0.6
New Road - Vine to Y Street	4007	3801	98	1.4	0.6
New Road - Y to Military Street	4007	3715	98	1.4	0.6
Adams Street Connector	4441	4452	98	1.6	0.4
New Road - Cornhusker to Superior	1942	1942	98	1.4	0.6

Table F.4
YEAR 2020 PEAK HOUR: INTERSECTION APPROACH VOLUME

Intersection	Peak Hour Volume							
	North-Bound Approach		South-Bound Approach		East-Bound Approach		West-Bound Approach	
	A.M.	P.M.	A.M.	P.M.	A.M.	P.M.	A.M.	P.M.
N-S Rd & O Street	2669	2632	2527	2493	977	1450	1188	784
N-S Rd & E-W Rd	1422	2187	2055	1398	1135	1752	2281	1698
E-W Rd & Cornhusker Hwy	1229	1940	1141	801	1911	2012	1589	1118
N-S Rd & Vine Street	1934	2835	2300	1501	1393	1393	1550	1008
E-W Rd & Theresa Street	1450	2463	1780	1343	141	160	2439	1843

3.0 Detailed Findings

3.1 Areas Studied

Three segments of roadways and five intersections were selected for analysis. A segment of one of the roadways and one of the intersections exist today; the remainder has not yet been built. A description of the roadways and intersections analyzed follows.

1) The entire new North-South Roadway was considered in this analysis. The North-South Roadway begins at K Street, proceeds north along the existing 19th Street alignment to about R Street. It then follows a new alignment, swinging east of the UNL Beadle Center, before continuing northwest, passing between the Cushman plant and the Abel dormitory, and joining 14th Street near Military Avenue. This roadway would ultimately be six lanes wide and average travel speeds are estimated to range from 40 km/hr (25 mph) between K and R Streets to 56 km/hr (35 mph) on the remainder of the roadway. Figures F.1 through F.5 show the geometry of the roadway and receptor locations.

2) Part of the new East-West Roadway was considered. The part considered begins at Cornhusker Highway east of Dead Mans Run, continues northeast through undeveloped land, crosses Salt Creek, and terminates at Superior Street. This roadway would ultimately be six lanes wide and average travel speed is estimated to be 40 km/hr 25 mph). Figure F.6 shows the geometry of the roadway and receptor locations.

3) The Adams Street Connector, from Theresa Street, proceeding southeast under the Burlington Northern Sante Fe (BNSF) mainline tracks and terminating at Adams Street, was considered. This roadway would be four lanes wide and average travel speed is estimated to be 40 km/hr 25 mph). Figure F.7 shows the geometry of the roadway and receptor locations.

4) The intersection of 19th (or the new North-South Roadway) and O Streets is located within the eastern portion of the central business district of the City. Surrounding land use includes parking lots and retail establishments. The existing intersection is characterized by east-west O Street, with two through-lanes, two left-turn lanes and one right-turn lane in each direction. The cross-street (19th Street) is a two-lane, two-way street running north-south with no turn lanes. The Draft Single Package would modify the 19th Street intersection to include three through-lanes, one right-turn and two left-turn lanes in each direction. The predicted level of service (LOS) rating after modification is LOS-D/E. Figure F.8 shows the geometry of the intersection and receptor locations.

5) The intersection of the new North-South Roadway and Vine Street is located northeast of the Beadle Center. Surrounding land use includes surface parking lots, recreation areas (Malone Center and Trago Park), industrial (Cushman Inc.) and University of Nebraska (UNL) classroom and research facilities (Beadle Center).

Figure F.1

Figure F.2

Figure F.3

Figure F.4

Figure F.5

Figure F.6

Figure F.7

Figure F.8

The North-South Roadway, with three through-lanes, one right-turn lane, and two left-turn lanes in each direction ultimately characterizes this intersection. The cross street (Vine Street) is currently a four-lane, two-way street running east-west. The Vine Street intersection proposed under the Draft Single Package would consist of two through-lanes, one right-turn and two left-turn lanes in each direction. The predicted LOS rating under the Draft Single Package is LOS-E. Figure F.9 shows the geometry of the intersection and receptor locations.

6) The intersection of the new North-South Roadway and the new East-West Roadway would be elevated approximately 8 meters (25 feet) above the BNSF mainline tracks that lie north of the UNL campus. Surrounding land use includes UNL dormitories, classroom and research facilities, residential dwellings, recreation areas, and light industrial development. The intersection is characterized by three through-lanes in all directions. The North-South Roadway would have dual right- and left-turn lanes (north-bound traffic) and a single right-turn lane and dual left-turn lanes (south-bound traffic). The East-West Roadway would have dual left-turn lanes and single right-turn lane for each direction. The predicted LOS rating is LOS-D. Figure F.10 shows the geometry of the intersection and receptor locations.

7) The intersection of the new East-West Roadway and Cornhusker Highway would be located east of Dead Mans Run. Surrounding land use is commercial and light industrial development. The intersection is characterized by three through-lanes, dual left-turn lanes, and single right-turn lanes in all directions. The predicted LOS rating is LOS-D. Figure F.11 shows the geometry of the intersection and receptor locations.

8) The intersection of the new East-West Roadway, Theresa Street and the new Adams Street connector would be located east of 27th Street. Surrounding land use is light industrial development. The East-West Roadway would have three through-lanes in each direction, with dual left and right-turn lanes northbound and dual left and a single right-turn lane southbound. Adams Street and Theresa Street would have single through-lanes, with dual left and single right-turn lanes. The predicted LOS rating is LOS-E. Figure F.12 shows the geometry of the intersection and the receptor locations.

3.2 Results

Using the models and assumptions given previously, detailed results are provided in Tables F.5 through F.12. Findings include:

- None of the receptors approach even 50% of the one-hour standard for CO. Therefore, no violations of the one-hour standard are anticipated.
- None of the receptors exceed the eight-hour standard for CO. However, several receptors close to the intersections of the North-South Roadway and O and Vine Streets equal (but do not exceed) the standard. This is not worrisome because worst-case conditions used in the model include full build-out traffic volumes with current vehicle emission factors. Due to highway funding mandates and technological advances, automobiles will gradually and ultimately emit far *lower* amounts of pollutants. Therefore, the worst-case conditions would not occur.

Figure F.9

Figure F.10

Figure F.11

Figure F.12

Table F.5*
NORTH-SOUTH ROADWAY - K STREET TO MILITARY ROAD
ONE-HOUR AND EIGHT-HOUR CO CONCENTRATION (parts per million)

Receptor	Identification	Year 2020 Predicted CO Concentration (ppm)						8-Hour NAAQS Standard
		1-Hour		8-Hour[1]		Cumulative 8-Hour[2]		
		A.M. Peak Hr.	P.M. Peak Hr.	A.M. Peak Hr.	P.M. Peak Hr.	A.M. Peak Hr.	P.M. Peak Hr.	
R1	Residence	4	4	2	3	4	5	9
R2	424 19th	5	5	3	3	5	5	9
R3	420 19th	5	5	3	3	5	5	9
R4	410 19th	5	6	3	3	5	5	9
R5	338 19th	4	5	3	3	5	5	9
R6	336 19th	4	4	2	3	4	5	9
R7	332 19th	5	6	3	3	5	5	9
R8	320 19th	5	6	3	3	5	5	9
R9	302 19th	5	6	3	3	5	5	9
R10	212 19th	5	5	3	3	5	5	9
R11	Parking Lot	4	4	3	3	5	5	9
R12	Residence	5	5	3	3	5	5	9
R13	Apartments	4	4	2	2	4	4	9
R14	Parking Lot	2	2	1	1	3	3	9
R15	138 N 19th	5	5	3	3	5	5	9
R16	Business	3	3	2	2	4	4	9
R17	Apartments	2	2	1	1	3	3	9
R18	1971 S Street	4	4	2	2	4	4	9
R19	1973 S Street	2	3	1	2	3	4	9
R20	Bike Path	3	3	2	2	4	4	9
R21	Bike Path	2	3	1	2	3	4	9
R22	Playground	2	2	1	1	3	3	9
R23	Malone Center	1	1	1	1	3	3	9
R24	Beadle Air	2	2	1	1	3	3	9
R25	Beadle Air	1	1	1	1	3	3	9
R26	Beadle Air	2	1	1	1	3	3	9
R27	Greenhouse Air	1	1	1	1	3	3	9
R28	Parking Lot	2	1	1	1	3	3	9
R29	UNL Property	2	2	1	1	3	3	9
R30	Cushman Inc.	1	1	1	0	3	2	9
R31	Parking Lot	3	2	2	1	4	3	9
R32	Parking Lot	2	2	1	1	3	3	9
R33	UNL Building	1	1	1	1	3	3	9
R34	UNL Building	1	1	1	1	3	3	9
R35	UNL Building	2	2	1	1	3	3	9
R36	Parking Lot	2	2	1	1	3	3	9
R37	1406 15th Street	1	1	1	1	3	3	9
R38	1436 15th Street	1	1	1	1	3	3	9
R39	1458 15th Street	1	1	1	1	3	3	9
R40	1452 15th Street	1	1	1	1	3	3	9
R41	1456 15th Street	1	1	1	1	3	3	9
R42	1500 15th Street	2	2	1	1	3	3	9
R43	1715 15th Street	1	1	0	0	2	2	9
R44	1711 15th Street	1	1	1	0	3	2	9
R45	Parking Lot	1	1	1	1	3	3	9
R46	Devany Center	1	1	0	0	2	2	9
R47	Parking Lot	2	1	1	1	3	3	9

Receptor	Identification	Year 2020 Predicted CO Concentration (ppm)						8-Hour NAAQS Standard
		1-Hour		8-Hour[1]		Cumulative 8-Hour[2]		
		A.M. Peak Hr.	P.M. Peak Hr.	A.M. Peak Hr.	P.M. Peak Hr.	A.M. Peak Hr.	P.M. Peak Hr.	
R48	Auto Lot	4	4	2	2	4	4	9
R49	Auto Lot	4	4	2	2	4	4	9
R50	Parking Lot	5	5	3	3	5	5	9
R51	Auto Lot	4	4	3	3	5	5	9
R52	Talbott Kitchens	3	3	2	2	4	4	9
R53	Parking Lot	3	3	2	2	4	4	9

[1] - After application of local persistence factor of 0.6 (0.6 x 1-hour concentration = 8- hour concentration)
[2] - Cumulative 8-hour equals the 1996 background concentration (2.0 ppm) plus predicted year 2020 8-hour concentration
* See Figures F.1 through F.5

Table F.6*
EAST-WEST ROADWAY - CORNHUSKER HIGHWAY TO SUPERIOR STREET
ONE-HOUR AND EIGHT-HOUR CO CONCENTRATION (parts per million)

Receptor	Identification	Year 2020 Predicted CO Concentration (ppm)						8-Hour NAAQS Standard
		1-Hour		8-Hour[1]		Cumulative 8-Hour[2]		
		A.M. Peak Hr.	P.M. Peak Hr.	A.M. Peak Hr.	P.M. Peak Hr.	A.M. Peak Hr.	P.M. Peak Hr.	
R1	Proposed Bike Path	1	1	1	1	3	3	9
R2	Proposed Bike Path	1	1	0	0	2	2	9
R3	33rd & Gladstone St.	0	0	0	0	2	2	9
R4	Proposed Bike Path	0	0	0	0	2	2	9
R5	Proposed Bike Path	1	1	0	0	2	2	9
R6	Proposed Bike Path	1	1	1	1	3	3	9
R7	Undeveloped	1	1	1	1	3	3	9
R8	Undeveloped	1	1	1	1	3	3	9
R9	Parking Lot	1	1	1	1	3	3	9

[1] - After application of local persistence factor of 0.6 (0.6 x 1-hour concentration = 8- hour concentration)
[2] - Cumulative 8-hour equals the 1996 background concentration (2.0 ppm) plus predicted year 2020 8-hour concentration
* See Figure F.6

Table F.7*
ADAMS STREET CONNECTOR ROADWAY
ONE-HOUR AND EIGHT-HOUR CO CONCENTRATION (parts per million)

Receptor	Identification	Year 2020 Predicted CO Concentration (ppm)						8-Hour NAAQS Standard
		1-Hour		8-Hour[1]		Cumulative 8-Hour[2]		
		A.M. Peak Hr.	P.M. Peak Hr.	A.M. Peak Hr.	P.M. Peak Hr.	A.M. Peak Hr.	P.M. Peak Hr.	
R1	Proposed Park	2	2	1	1	3	3	9
R2	Proposed Bike Path	1	1	1	1	3	3	9
R3	Proposed Bike Path	1	1	0	0	2	2	9
R4	36th & Cleveland St.	0	0	0	0	2	2	9
R5	37th & Cleveland St.	0	0	0	0	2	2	9
R6	38th & Cleveland St.	0	0	0	0	2	2	9
R7	Parking Lot	1	1	0	0	2	2	9
R8	Parking Lot	1	1	0	0	2	2	9

[1] - After application of local persistence factor of 0.6 (0.6 x 1-hour concentration = 8- hour concentration)
[2] - Cumulative 8-hour equals the 1996 background concentration (2.0 ppm) plus predicted year 2020 8-hour concentration
* See Figure F.7

Table F.8*
INTERSECTION OF NORTH-SOUTH ROADWAY & O STREET
ONE-HOUR AND EIGHT-HOUR CO CONCENTRATION (parts per million)

Receptor	Identification	Year 2020 Predicted CO Concentration (ppm)						8-Hour NAAQS Standard
		1-Hour		8-Hour[1]		Cumulative 8-Hour[2]		
		A.M. Peak Hr.	P.M. Peak Hr.	A.M. Peak Hr.	P.M. Peak Hr.	A.M. Peak Hr.	P.M. Peak Hr.	
R1		8	8	5	5	7	7	9
R2		11	12	7	7	9	9	9
R3		10	8	6	5	8	7	9
R4		7	6	4	3	6	5	9
R5		6	5	3	3	5	5	9
R6		8	9	5	5	7	7	9
R7		7	7	4	4	6	6	9
R8		10	11	6	7	8	9	9
R9		11	12	7	7	9	9	9
R10		11	12	6	7	8	9	9
R11		11	12	7	7	9	9	9
R12		8	9	5	5	7	7	9
R13		9	9	5	6	7	8	9
R14		8	9	5	5	7	7	9
R15		8	9	5	5	7	7	9
R16		9	8	5	5	7	7	9
R17		11	11	6	7	8	9	9
R18		6	8	4	5	6	7	9
R19		6	7	4	4	6	6	9
R20		9	9	5	5	7	7	9
R21		6	7	4	4	6	6	9
R22		9	11	5	6	7	8	9
R23		11	11	7	6	9	8	9
R24		10	11	6	6	8	8	9
R25		9	10	5	6	7	8	9
R26		7	8	4	5	6	7	9
R27		7	9	4	5	6	7	9
R28		7	9	4	5	6	7	9
R29		7	8	4	5	6	7	9

[1] - After application of local persistence factor of 0.6 (0.6 x 1-hour concentration = 8- hour concentration)
[2] - Cumulative 8-hour equals the 1996 background concentration (2.0 ppm) plus predicted year 2020 8-hour concentration
* See Figure F.8

Table F.9*
INTERSECTION OF NORTH-SOUTH ROADWAY & VINE STREET
ONE-HOUR AND EIGHT-HOUR CO CONCENTRATION (parts per million)

Receptor	Identification	Year 2020 Predicted CO Concentration (ppm)						8-Hour NAAQS Standard
		1-Hour		8-Hour[1]		Cumulative 8-Hour[2]		
		A.M. Peak Hr.	P.M. Peak Hr.	A.M. Peak Hr.	P.M. Peak Hr.	A.M. Peak Hr.	P.M. Peak Hr.	
R1	Edge of City ROW	9	8	6	5	8	7	9
R2	Edge of City ROW	11	11	6	7	8	9	9
R3	Edge of City ROW	11	8	6	5	8	7	9
R4	Edge of City ROW	9	6	5	4	7	6	9
R5	Edge of City ROW	8	6	5	4	7	6	9
R6	Edge of City ROW	8	8	5	5	7	7	9
R7	Edge of City ROW	7	7	4	4	6	6	9
R8	Edge of City ROW	10	10	6	6	8	8	9
R9	Edge of City ROW	11	11	7	7	9	9	9
R10	Edge of City ROW	10	11	6	7	8	9	9
R11	Edge of City ROW	8	11	5	6	7	8	9
R12	Edge of City ROW	7	7	4	4	6	6	9
R13	Edge of City ROW	9	8	5	5	7	7	9
R14	Edge of City ROW	8	8	5	5	7	7	9
R15	Edge of City ROW	7	7	4	4	6	6	9
R16	Edge of City ROW	9	8	6	5	8	7	9
R17	Edge of City ROW	12	11	7	6	9	8	9
R18	Edge of City ROW	10	8	6	5	8	7	9
R19	Edge of City ROW	8	7	5	4	7	6	9
R20	Edge of City ROW	8	8	5	5	7	7	9
R21	Edge of City ROW	7	6	4	4	6	6	9
R22	Edge of City ROW	8	9	5	5	7	7	9
R23	Edge of City ROW	11	10	6	6	8	8	9
R24	Edge of City ROW	9	9	5	6	7	8	9
R25	Edge of City ROW	9	7	5	4	7	6	9
R26	Edge of City ROW	6	6	4	3	6	5	9
R27	Edge of City ROW	6	7	4	4	6	6	9
R28	Edge of City ROW	7	8	4	5	6	7	9
R29	Edge of City ROW	6	7	4	4	6	6	9
R30	Edge of City ROW	4	4	3	3	5	5	9
R31	Edge of City ROW	4	3	2	2	4	4	9
R32	Beadle Ctr-North Air	6	5	3	3	5	5	9
R33	Beadle Ctr-East Air	5	5	3	3	5	5	9
R34	Greenhouse Air	4	4	2	2	4	4	9

[1] - After application of local persistence factor of 0.6 (0.6 x 1-hour concentration = 8- hour concentration)
[2] - Cumulative 8-hour equals the 1996 background concentration (2.0 ppm) plus predicted year 2020 8-hour concentration
* See Figure F.9

Table F.10*
INTERSECTION OF NORTH-SOUTH & EAST-WEST ROADWAYS
ONE-HOUR AND EIGHT-HOUR CO CONCENTRATION (parts per million)

Receptor	Identification	Year 2020 Predicted CO Concentration (ppm)						8-Hour NAAQS Standard
		1-Hour		8-Hour[1]		Cumulative 8-Hour[2]		
		A.M. Peak Hr.	P.M. Peak Hr.	A.M. Peak Hr.	P.M. Peak Hr.	A.M. Peak Hr.	P.M. Peak Hr.	
R1	Proposed Park	3	3	2	2	4	4	9
R2	Proposed Park	3	3	2	2	4	4	9
R3	Proposed Park	4	5	2	3	4	5	9
R4	Parking Lot	3	3	2	2	4	4	9
R5	Parking Lot	6	5	3	3	5	5	9
R6	1406 15th Street	3	3	2	2	4	4	9
R7	1436 15th Street	3	3	2	2	4	4	9
R8	1458 15th Street	4	3	2	2	4	4	9
R9	1452 15th Street	3	3	2	2	4	4	9
R10	1456 15th Street	3	3	2	2	4	4	9

[1] - After application of local persistence factor of 0.6 (0.6 x 1-hour concentration = 8- hour concentration)
[2] - Cumulative 8-hour equals the 1996 background concentration (2.0 ppm) plus predicted year 2020 8-hour concentration
* See Figure F.10

Table F.11*

INTERSECTION OF EAST-WEST ROADWAY & CORNHUSKER HIGHWAY

ONE-HOUR AND EIGHT-HOUR CO CONCENTRATION (parts per million)

Receptor	Identification	Year 2020 Predicted CO Concentration (ppm)						8-Hour NAAQS Standard
		1-Hour		8-Hour[1]		Cumulative 8-Hour[2]		
		A.M. Peak Hr.	P.M. Peak Hr.	A.M. Peak Hr.	P.M. Peak Hr.	A.M. Peak Hr.	P.M. Peak Hr.	
R1	Edge of City ROW	9	8	5	5	7	7	9
R2	Edge of City ROW	10	10	6	6	8	8	9
R3	Edge of City ROW	8	6	5	4	7	6	9
R4	Edge of City ROW	4	4	3	2	5	4	9
R5	Edge of City ROW	4	4	2	2	4	4	9
R6	Edge of City ROW	5	5	3	3	5	5	9
R7	Edge of City ROW	7	6	4	3	6	5	9
R8	Edge of City ROW	6	6	4	3	6	5	9
R9	Edge of City ROW	8	9	5	5	7	7	9
R10	Edge of City ROW	10	11	6	6	8	8	9
R11	Edge of City ROW	5	8	3	5	5	7	9
R12	Edge of City ROW	4	5	2	3	4	5	9
R13	Edge of City ROW	4	4	2	3	4	5	9
R14	Edge of City ROW	6	6	3	4	5	6	9
R15	Edge of City ROW	7	6	4	4	6	6	9
R16	Edge of City ROW	6	6	3	4	5	6	9
R17	Edge of City ROW	9	9	5	5	7	7	9
R18	Edge of City ROW	11	10	6	6	8	8	9
R19	Edge of City ROW	8	9	5	5	7	7	9
R20	Edge of City ROW	6	5	4	3	6	5	9
R21	Edge of City ROW	4	4	2	2	4	4	9
R22	Edge of City ROW	5	6	3	4	5	6	9
R23	Edge of City ROW	6	7	4	4	6	6	9
R24	Edge of City ROW	6	6	3	4	5	6	9
R25	Edge of City ROW	9	9	5	5	7	7	9
R26	Edge of City ROW	11	10	6	6	8	8	9
R27	Edge of City ROW	8	6	5	3	7	5	9
R28	Edge of City ROW	4	4	2	2	4	4	9
R29	Edge of City ROW	4	3	2	2	4	4	9
R30	Edge of City ROW	5	4	3	3	5	5	9
R31	Edge of City ROW	6	6	4	4	6	6	9
R32	Edge of City ROW	6	6	4	4	6	6	9

[1] - After application of local persistence factor of 0.6 (0.6 x 1-hour concentration = 8- hour concentration)

[2] - Cumulative 8-hour equals the 1996 background concentration (2.0 ppm) plus predicted year 2020 8-hour concentration

* See Figure F.11

Table F.12*
INTERSECTION OF EAST-WEST ROADWAY & THERESA STREET
ONE-HOUR AND EIGHT-HOUR CO CONCENTRATION (parts per million)

Receptor	Identification	Year 2020 Predicted CO Concentration (ppm)						8-Hour NAAQS Standard
		1-Hour		8-Hour[1]		Cumulative 8-Hour[2]		
		A.M. Peak Hr.	P.M. Peak Hr.	A.M. Peak Hr.	P.M. Peak Hr.	A.M. Peak Hr.	P.M. Peak Hr.	
R1	Edge of City ROW	4	5	3	3	5	5	9
R2	Edge of City ROW	5	6	3	3	5	5	9
R3	Edge of City ROW	6	6	3	4	5	6	9
R4	Edge of City ROW	5	6	3	3	5	5	9
R5	Edge of City ROW	4	4	2	3	4	5	9
R6	Edge of City ROW	3	3	2	2	4	4	9
R7	Edge of City ROW	4	4	2	2	4	4	9
R8	Edge of City ROW	4	4	2	2	4	4	9
R9	Edge of City ROW	5	5	3	3	5	5	9
R10	Edge of City ROW	7	6	4	4	6	6	9
R11	Edge of City ROW	7	6	4	4	6	6	9
R12	Edge of City ROW	6	7	4	4	6	6	9
R13	Edge of City ROW	6	7	4	4	6	6	9
R14	Edge of City ROW	4	4	2	2	4	4	9
R15	Edge of City ROW	4	5	3	3	5	5	9
R16	Edge of City ROW	6	6	3	3	5	5	9
R17	Edge of City ROW	6	6	3	3	5	5	9
r18	Edge of City ROW	6	5	4	3	6	5	9
R19	Edge of City ROW	3	3	2	2	4	4	9
R20	Edge of City ROW	3	3	2	2	4	4	9
R21	Edge of City ROW	2	2	1	1	3	3	9
R22	Edge of City ROW	2	2	1	1	3	3	9
R23	Edge of City ROW	3	3	2	2	4	4	9
R24	Edge of City ROW	3	3	2	2	4	4	9
R25	Edge of City ROW	4	4	2	2	4	4	9
R26	Edge of City ROW	5	5	3	3	5	5	9
R27	Edge of City ROW	5	5	3	3	5	5	9
R28	Edge of City ROW	5	5	3	3	5	5	9
R29	Edge of City ROW	5	4	3	3	5	5	9
R30	Edge of City ROW	3	3	2	2	4	4	9
R31	Edge of City ROW	4	3	2	2	4	4	9
R32	Edge of City ROW	4	4	2	2	4	4	9

[1] - After application of local persistence factor of 0.6 (0.6 x 1-hour concentration = 8- hour concentration
[2] - Cumulative 8-hour equals the 1996 background concentration (2.0 ppm) plus predicted year 2020 8-hour concentration
* See Figure F.12